

A Study on Path Coefficients and Character Association in Cowpea (*Vigna unguiculata* (L.) Walp)*

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Abstract : Correlations were studied among twelve quantitative characters viz., plant height, number of primary branches, number of pod clusters per plant, pods per cluster, peduncle length, pods per plant, pod yield per plant, pod length, number of gaps in pod, seeds per pod, hundred seed weight and seed yield in F_2 generation of the cross 82 1 B x V 37. The seed yield showed significant positive association with pod yield, number of pods per plant, pod clusters per plant and length of pod. Path coefficient analysis showed that pod yield had the highest positive direct effect on yield. Hundred seed weight, plant height and number of pod clusters per plant showed negative direct effects on yield. Pod yield per plant can be used as a reliable parameter for yield in cowpea.

Introduction

The correlation and path analysis studies are of great help in formulating efficient breeding programme for multiple trait selection. In a crop like cowpea where production of hybrids is out of question and hybridisation followed by selection is the main procedure for improvement, the knowledge on correlations is an obligate necessity for achieving genetic improvement. Majority of the reports of path analysis are based on variability existing between homozygous cultivars (Singh and Mahendiratta, 1970 and Chauhan and Joshi, 1980). It is necessary to emphasize that inferences derived from these will be meaningful only when this study is based on individual plant observations in a segregating generation like F_2 . In addition to this, the variability should represent a wide range of segregation and recombination of genes influencing different quantitative traits so as to provide a precise and reliable measure of association between

characters. To ensure that this type of material is generated in F_2 , the parents included in the cross should be as diverse as possible. Keeping these points in view, the present study was initiated involving two diverse cultivars of cowpea.

The value of correlation between yield and an yield trait gives the net effect of the relationship seen between the two characters. It is influenced by the relationship of the yield trait with other yield traits. Path analysis helps in estimating the contribution of direct and indirect effects influencing the association of the two characters.

Material and Methods

A cross was made between an early and determinant cultivar 82 1B and a late and trailing variety V 37 during rabi 1985 season. The F_1 was grown in summer season to obtain seeds for growing F_2 generation. The F_2 generation was grown in kharif 1986.

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After eliminating border plants, 180 plants were randomly selected to record data on various parameters listed in Table 1. The individual plant observations were used for calculating correlation coefficients among different characters in F_2 . Further, these correlations were used for conducting path analysis based on the method given by Dewey and Lu (1959).

Results and Discussion

A highly significant and positive correlation at phenotypic level existed between pod yield and seed yield per plant (Table 1) indicating that pod yield is a much reliable component of seed yield and can very well be utilised as an yield indicator in selection programme. Similar association was also observed by Mak and Yap (1977), Hanchinal *et al.* (1979) and Biradar (1988). Number of pods per plant revealed a strong association with seed yield. This confirms the results of Virupakshappa *et al.* (1980), Gowda (1981), Marangappanavar (1984) and Biradar (1988). Pod clusters per plant also exhibited a strong positive correlation existing between pod number and number of pod clusters per plant. Jindla and Gupta (1984) and Biradar (1988) also observed such high correlations. The other trait that had significant association with seed yield was length of the pod.

Path analysis revealed that pod yield had the highest positive direct effect on seed yield (Table 2). The traits, plant height and hundred seed weight, showed a negative direct effect. The direct effect of number of pod clusters per plant was negative, while that of number of pods per plant was positive and very negligible. The strong correlation of these traits with seed yield may be from the high positive indirect effect through pod yield.

The present study clearly indicates that the variation in yield was accounted mainly for its association with pod weight.

Several workers have also considered pod weight as an important yield component in cowpea (Mak and Yap, 1977; Hanchinal *et al.*, 1979 Marangappanavar, 1984 and Biradar, 1988)

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Table 1. Simple phenotypic correlation coefficients between different pairs of characters in the F_2 of the cross 82 1B x V 37

Character	Plant height (cm)	Number of primary branches per plant	Number of pod clusters per plant	Number of pods per cluster	Peduncle length (cm)	Number of pods per plant	Pod yield per plant (g)	Pod length (cm)	Number of gaps in the pod	Number of seeds per pod	100 seed weight (g)	Seed yield per plant (g)
	1	2	3	4	5	6	7	8	9	10	11	12
1		-0.1391*	-0.0496	0.0252	-0.0047	-0.0333	-0.1189	-0.2011**	0.2531**	-0.1871*	-0.0979	-0.2039**
2			-0.0930	0.1089	0.0519	-0.0829	-0.1140	-0.0207	0.1140	-0.0777	-0.0062	-0.0223
3				-0.5133**	-0.0916	0.7783**	0.7392**	0.1632*	-0.1651*	0.1933**	-0.0262	0.2936**
4					0.1381*	-0.0180	-0.0506	0.0403	0.1643*	-0.0661	0.0002	0.009
5						0.0292	0.0341	-0.0624	-0.0695	0.0083	-0.0229	0.0661
6							0.9157**	0.1933**	-0.1484*	0.2399**	-0.0836	0.4101**
7								0.3091**	-0.2097**	0.3285**	-0.0333	0.4813**
8									-0.1715*	0.4607**	0.0116	0.1978**
9										-0.6574**	0.0678	-0.0164
10											-0.0368	0.1180
11												-0.0301

* Significant at 5 per cent level

** Significant at 1 per cent level

2. Path Coefficient analysis in F_2 of the cross 82 1B x V37

Character	Plant height (cm)	Number of primary branches per plant	Number of pod clusters per plant	Number of pods per cluster	Peduncle length (cm)	Number of pods per plant	Pod yield per plant (g)	Pod length (cm)	Number of gaps in the pod	Number of seeds per pod	100 seed weight (g)	Correlation with seed yield
1	2	3	4	5	6	7	8	9	10	11	12	
1	-0.1721	0.0003	0.0108	-0.0027	-0.0002	-0.0005	-0.0739	-0.0085	0.0374	0.0021	0.0034	-0.2039 **
2	0.0239	-0.0023	0.0204	-0.0118	0.0026	-0.0012	-0.0708	-0.0008	0.0168	0.0089	0.0002	-0.0223
3	0.0085	0.0002	-0.2195	0.0560	-0.0046	0.0120	0.4596	0.0069	-0.0243	-0.0022	0.0101	0.2936 **
4	-0.0043	-0.0002	0.1127	-0.1092	0.0070	-0.0002	-0.0314	0.0017	0.0242	0.0007	-0.0000	0.0009
5	0.0008	-0.0001	0.0201	-0.0150	0.0508	0.0004	0.0212	-0.0026	-0.0102	-0.0115	0.0008	0.0661
6	0.0006	0.0001	-0.1708	0.0019	0.0014	0.0154	0.5993	0.0082	-0.0219	-0.0027	-0.0032	0.4101 **
7	0.0204	0.0002	-0.1622	0.0055	0.0017	0.0141	0.6217	0.0131	-0.0309	-0.0037	0.0012	0.4813 **
8	0.0346	0.0000	-0.0358	-0.0044	-0.0031	0.0029	0.1921	0.0424	-0.0253	-0.0053	-0.0004	0.1978 **
9	-0.0435	-0.0002	0.0362	-0.0179	-0.0035	-0.0022	-0.1303	-0.0072	0.1476	0.0075	-0.0026	-0.0164
10	0.0322	0.0001	-0.0424	0.0072	0.0004	0.0037	0.2042	0.0195	-0.0970	-0.0115	0.0015	0.1180
11	0.0151	0.0000	0.0057	-0.0000	-0.0011	-0.0012	-0.0207	0.0004	0.0100	0.0004	-0.3876	-0.0301

Bold figures indicate direct values

association in cowpea (*Vigna unguiculata* (L.) Walp.). *Ph.D. Thesis*, Univ. Agril. Sci., Bangalore.

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